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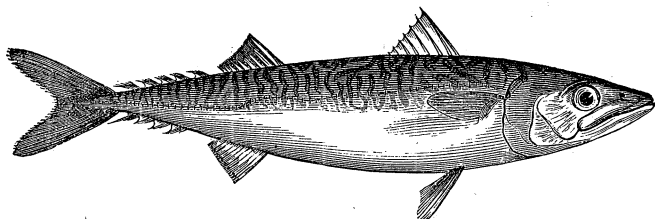
T H E
AMERICAN NATURALIST.

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THE HABITS AND MIGRATIONS OF SOME OF THE
MARINE FISHES OF MASSACHUSETTS.

BY JAMES H. BLAKE.

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Fig. 108.



The Mackerel, *Scomber vernalis*.

THE part of Natural History relating to the habits of fishes is far behind other branches of this study, comparatively little being known of this interesting subject. The reason of this is plainly understood when we consider how small is the number of persons interested in such studies, who have the opportunity of observing the fishes a sufficient length of time to enable them to gain any great amount of information concerning them. Those who have the opportunity for gathering such information are of the class who look more to the financial profit from this business than to the benefit in knowledge they may gain. There is fortunately another class of individuals, who, while striving for their own maintenance, are careful to record the numerous

interesting facts which come under their observation; but, unhappily for science, this class is too small to occupy the field, and consequently we are kept in ignorance of this important matter.

The migration of the fishes on our coast may, in a measure, be compared to that of the birds on the land, both being governed by the seasons. The song birds, for instance, which frequent our villages during the summer and attract our attention by their musical strains, we greatly miss during the winter months, and we know that they have gone to parts where the temperature is better adapted for their subsistence and comfort. Those who reside at the seashore all the year observe movements among the fishes similar to those seen in the birds, and the time when each species of fish that is of value to the fishermen will make its appearance in any particular locality on the coast is practically known. Nearly all the fishes change their habitat as the different seasons advance, some by going to more northern or southern latitudes, while others move simply from deeper to shallower water, and *vice versa* to find the temperature they require.

There are no fish which remain in one and the same locality or fishing-ground the year around. Consumers of fish are acquainted with the fact that all our marketable fishes are found at a regular and limited period in our markets.

The Mackerel (*Scomber vernalis*), Fig. 108, come into the shallow water near the land directly from their winter habitat, the deep water of the Atlantic, during the months of May and June, and their annual appearance is very regular. They approach the coast for the purpose of spawning, and on reaching a favorable situation, immediately deposit their eggs, and leave them without farther protection. The number of eggs deposited in one season by each female is estimated to be between five and six hundred thousand. After spawning the fish move northward, following the line of the coast till they are checked by the chill of the water, when they return, and, in the month of November, seek the deep

water again. Those mackerel which first come in contact with the land at Cape Cod will migrate as far as the northern part of the coast of Maine. They are not easily caught with the hook during their spawning season, and it is at this time that "gill-nets" are used to the best advantage. The mackerel at this time are very lean, and the flesh has a darkish appearance, while at the time of their departure from the coast they are flat and plump, and are then considered to be in the best condition for food, and consequently bring the highest price.

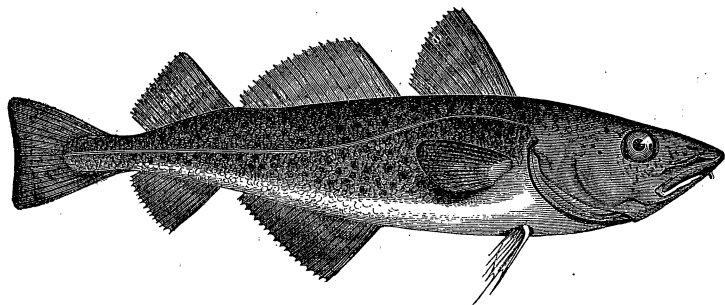
In comparing the number observed in one season with another the difference may be very great, but on the whole they cannot be considered as either increasing or decreasing in numbers. Some seasons they will be very plentiful, and schools of them may be seen near the surface of the water one or two miles in extent. When seen thus manœuvring in such great abundance they will not allow themselves to be taken with the hook very extensively; it is then that the purse-seines are used to the best advantage in capturing them. At other times, perhaps the following day, the fish will be entirely unobservable in the water, but when "tob-bait" is thrown over to "raise them," they will perhaps soon be seen by the side of the vessel in vast numbers, and will readily take the hook. Sometimes a crew of fifteen men will catch over a hundred barrels of them in a few hours. In those years when many fish are seen it has been observed that they are small, and that in those seasons in which the number is less they are large. This is probably owing in part to the number destroyed when young, and in part to the fact of a larger number than usual spawning on the outer banks.

Mackerel are always on the move and migrate in schools. In the spring, when they are caught in gill-nets, the quantity taken in the different nights varies considerably. Fishing with "drift-nets" is practiced in the night, for the fish cannot be caught in this way in the daytime, as the net is then

easily seen by them and avoided; they also swim deeper during the day, and would thus pass under or below the nets. The fishermen cast their nets about dusk; soon after, the fish are observed in them, and often before ten o'clock in the evening the nets will contain thousands of mackerel. The fishermen may visit the same locality the following night and be very unsuccessful, while the reports from other boats will show that the greater proportion of the fish were in another direction, and also that they move constantly and in large schools.

Mackerel, like most fishes, have their choice in respect to food. This consists of the young of other species and of

Fig. 109.

The Codfish, *Morrhu Americana*.

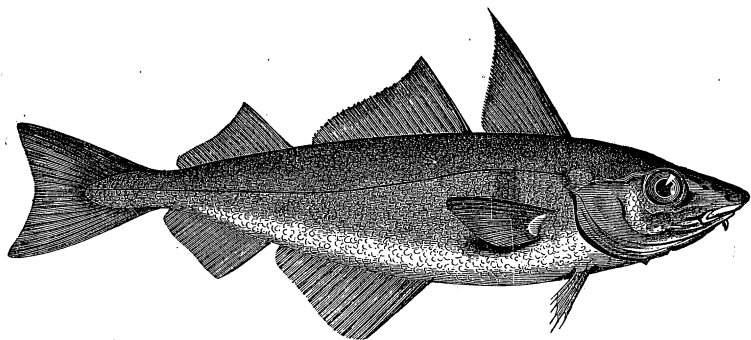
crustacea. The "tole-bait" consists chiefly of Menhaden (*Alausa menhaden*) ground very fine, with which clams are sometimes mixed, as they are believed to improve its quality. The bait commonly used for the hook is a piece of white skin cut from the throat of a mackerel, but when they are abundant and ferocious any white material will do; sometimes a small silver coin is used, and it is not uncommon for them to be taken on the bare hook.

The Codfish (*Morrhu Americana*), Fig. 109, is another familiar marine species, but one which differs very considerably in its habits from the mackerel. It is found in our markets all the year, but is not taken at all times from the

same locality or fishing-ground. This fish does not migrate along the coast, but acquires its desired temperature by gradually moving from shallower to deeper water, and returning as the season grows colder. Nearly all fish which go in schools migrate more or less along the coast after coming from the deeper water, while those which are distributed over the bottom, as the Cod, Haddock, etc., do not migrate except from shallower to deeper water.

Codfish visit the shallow water of Massachusetts Bay to spawn about the first of November, and towards the last of

Fig. 110.



The Haddock, *Morhua eglefinus*.

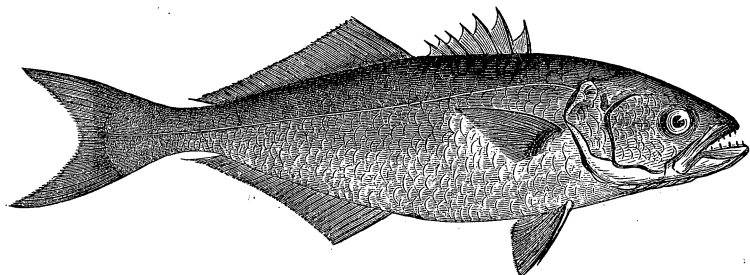
this month deposit their eggs on the sandy banks and rocky ledges.* About eight or nine millions of ova are annually deposited by each female. The codfish remain in the vicinity of their eggs till June, when they again retire to deeper water, the shallow water having become too warm for them.

The codfish, like the mackerel, takes no care of its eggs, and only a small portion of these ever arrive at maturity. Nature so regulates the destiny of these eggs that only a portion of them are permitted to mature, otherwise the

* G. O. Sars of Christiania, Norway, has observed that codfish deposit their spawn at the surface of the water, where the ova float throughout the whole of their development. He has followed up the development of the egg, and of the young, during the first fortnight after exclusion. The embryo leaves the egg on the 16th day. See Günther's Zoological Record for 1838. — EDITORS.

codfish would soon monopolize the whole ocean. These eggs are eagerly devoured as food by the various animals which inhabit the bottom, and the proportion of eggs destroyed in this and other ways cannot be readily estimated, but we know it must be enormous by the comparatively few young fish we see. If, during its stay in shallow water, the weather should suddenly become cold, and so remain for two or three days, the codfish immediately retreats to water of some forty fathoms in depth, and does not return till the temporary change has passed; then they gradually seek their

Fig. 111.

The Bluefish, *Temnodon saltator*.

former resort, which is a depth of fifteen or twenty fathoms. The Haddock (Fig. 110) at such times likewise retreats, but does not so soon return to its former station.

The quantity of codfish annually taken does not differ so much in the different years as does that of the mackerel, yet the amount is somewhat variable. The cause is the same in both cases, but as the codfish has a shorter distance to come the annual number is naturally less variable. The number of codfish existing at the present time does not appear to differ from that of twenty or more years ago, and I think we are safe in assuming that there has been no perceptible diminution for a century.

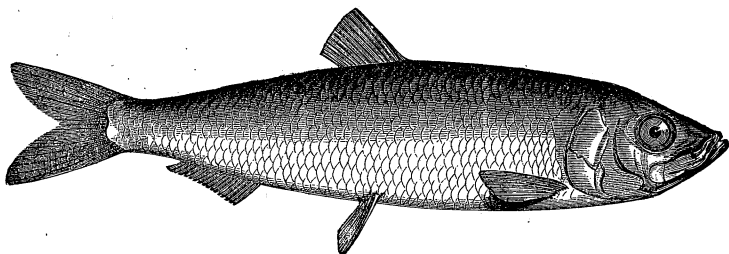
The food of the codfish consists of smaller fish, mollusks and crustacea. The bait considered by the fishermen as best adapted to their tastes are the common Herring (*Clupea elongata*), squid, etc., but clams (*Mya arenaria* and *Macra*

solidissima) are more generally used, as only this bait can be obtained at all seasons of the year; clams are also found to remain longer on the hooks.

Nearly all the codfish obtained on our coast are brought to market in an unsalted condition, but they form only a small portion of the number sold in Massachusetts. The majority of the codfish sold here are brought from the Banks of Newfoundland and other great banks, and are always brought in a salted state.

We have already stated that although many hundred thousands of mackerel and codfish are captured through the agency of man, and many more are destroyed by other influences, there has been, notwithstanding, no noticeable change

Fig. 112.



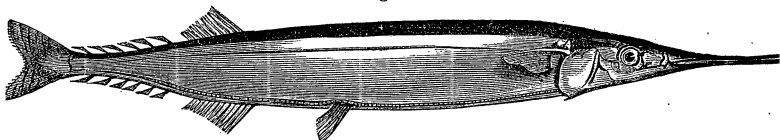
The Herring, *Clupea elongata*.

in their numbers. But there are some species of fish which visit our coast that are constantly diminishing in numbers, and our shores were formerly frequented by some fishes in great quantities, which have now nearly, if not quite, disappeared.

The Bluefish (*Temnodon saltator*), Fig. 111, which inhabits our waters from the last of June till September, has had very marked periodic variations in numbers. This fish, as history informs us, was captured and esteemed as an article of food by the earlier settlers of this state. Previous to the year 1763 bluefish were very plenty on the southern coast of Cape Cod, but about this year they all disappeared, and none were taken till sixty or seventy years after. For the

past thirty years specimens have been taken, but they did not arrive in any noticeable abundance till within the last sixteen years, and are at the present time again vanishing. During the last mentioned period I have observed them about Provincetown in great abundance, where they often presented a beautiful spectacle. At times the splashing of the water caused by these fish in their rapid motions in pursuit of their prey, could be seen as far as the eye can reach. They make great havoc among their weaker neighbors, and some fishes have been entirely driven from our waters by this ferocious species. All fish which are a prey to the bluefish migrate on its first appearance. In the case of the mackerel, fishermen have noticed that when a few bluefish have been caught during the mackerel season, that a few days after not

Fig. 113.

The Bill-fish, *Scomberesox Storerii*.

a mackerel could be found, having been driven from the vicinity by the bluefish. I think it may be affirmed that the disappearance of so many of our smaller fish is due to the destructive nature of the bluefish; it even drives fish much its superior in size.

In respect to our smaller fishes, the Herring (*Clupea elongata*), etc., we observe a considerable decrease in the numbers which now annually visit our shores, as compared with their former numbers. The Poggy (*Alosa Menhaden*) and the Herring (*Clupea elongata*), Fig. 112, have comparatively almost deserted the waters about Provincetown, where I have formerly seen them in immense schools very near the shore. Fishermen made nets and other necessary preparations every year to capture them on their arrival in the spring, and the business was carried on extensively and profitably for many years, but at the present time no such fishing there exists.

The Bill-fish (*Scomberesox Storerii*), Fig. 113, which but fifteen years since I saw stranded on the shore by the thousands, driven in by its devouring pursuers, has gradually decreased, till at the present time it has nearly, if not quite, been driven away, and I think that during the past year there was not one specimen seen at Provincetown.

CULTIVATION OF ALPINE FLOWERS.

BY ALFRED W. BENNETT.

MR. ROBINSON is no mere enthusiast in his subject when he says :—"This book ('Alpine Flowers for English Gardens') is written to dispel a very general error that the exquisite flowers of alpine countries cannot be grown in gardens, and as one of a series of manuals having for their object the improvement of our out-door gardening, which it appears to me, is of infinitely greater importance than anything that can ever be accomplished in enclosed structures, even if glass sheds or glass palaces were within the reach of all." His first concern is with the structure of rockeries, in the mode of building which not only is the taste still displayed, or at all events till quite recently, barbarous and inartistic in the extreme ; but it would seem as if the very conditions necessary for the health of the plants were studiously neglected. The ordinary idea of the treatment of rock-plants, judging from the hideous monstrosities which may be seen in many a gentleman's garden, is that you have nothing to do but to poke them in between the chinks of perfectly bare stones or clinkers piled together in a promiscuous heap, in order to present them in their native habitats. A gardener who commits such an absurdity as this, can never have ascended a mountain with his eyes open. To quote again from Mr. Robinson :—"Mountains are often bare, and cliffs are